

# HL7137

## Dual-Phase 7.5A 2:1 Direct Charge Pump Charger

### Overview

The HL7137 is the low voltage fast direct charger for 1 cell Li-ion and Li-polymer batteries. The device integrates a dual phase switched capacitive converter, a reverse blocking MOSFET (QRB FET) and shows 97.3% efficiency at 4.5V output and 5A current with flying capacitor, 2x22 $\mu$ F, per phase.

The device features an OVP protection with an external FET to reduce the total BOM in applications. The 2:1 CP mode allows the output voltage, VOUT, to be around half of the input voltage, VIN, and the output current to be double of the input current.

The device provides CC (Constant Current) and CV (Constant Voltage) regulation through the QRB FET for a safe charging operation in 2:1 CP and 1:1 BP mode. The CC regulation is controlled through a close loop of the input current sensing or battery current sensing and CV regulation is controlled through a close loop of sensing the battery voltage. In addition, the device also supports thermal regulation loop in case CV/CC loop causing device over-heat during regulation operating in 2:1 CP mode.

The device has all the necessary protections to ensure the safe operation. The device includes OTP (Over-Temperature Protection), VIN UVP (Under-Voltage Protection), OVP (Over-Voltage Protection), IIN OCP (Over-Current Protection), UCP (Under-Current Protection), VOUT OVP/UVP, VBAT OVP, IBAT OCP, PMID to VOUT OV/UV Tracking, CFLY SCP (Short Circuit Protection), VIN SCP, VOUT SCP, QRB RCP (Reverse-Current Protection) and Watchdog Timer. Besides all the protections above, the device also features 12-bit ADC that offers VIN, IIN, VOUT, VBAT, IBAT, VTS, TDIE information to system for optimizing charging control

### Features

- 20V AMR on VIN pin
- 3V to 11.7V Operational VIN Voltage
- 5.5V Max Operational Output Voltage
- Dual-Phase Switched Capacitor Architecture
- Dual Conversion Modes: 2:1 CP and 1:1 BP
- Continuous 7.5A output in both modes
- Regulation loop for charging operation through QRB FET control
  - Input current regulation ( $I_{IN\_REG}$ )
  - Battery voltage regulation ( $V_{VBAT\_REG}$ )
  - Battery current regulation ( $I_{BAT\_REG}$ )
  - Thermal regulation ( $T_{DIE\_REG}$ )
- 97.3% Efficiency for VOUT=4.5V\_5A with 1x22 $\mu$ F per phase
- Selectable switching frequency from 500kHz to 1.6MHz
- Integrated 12-bit ADC
  - Input voltage (VIN)
  - Output voltage (VOUT)
  - Battery voltage (VBAT)
  - Input current in bidirectional readback
  - Battery current (IBAT)
  - TS input voltage (VTS)
  - Die temperature (TDIE)
- Protections
  - VBAT over voltage protection
  - Over Die temperature protection
  - VIN Over/Under voltage protection
  - Voltage tracking protection
  - Input over current protection
  - VOUT over voltage protection
  - IBAT over current protection
  - VOUT short circuit protection
  - VIN short circuit protection
  - CFLY short circuit protection
  - NTC protection
- 2.67mm x 2.63mm 36-bump WLCSP, 0.4mm pitch

## Applications

- Smartphones
- Tablet PC
- Mobile IoT Devices

## Simplified Application Diagrams

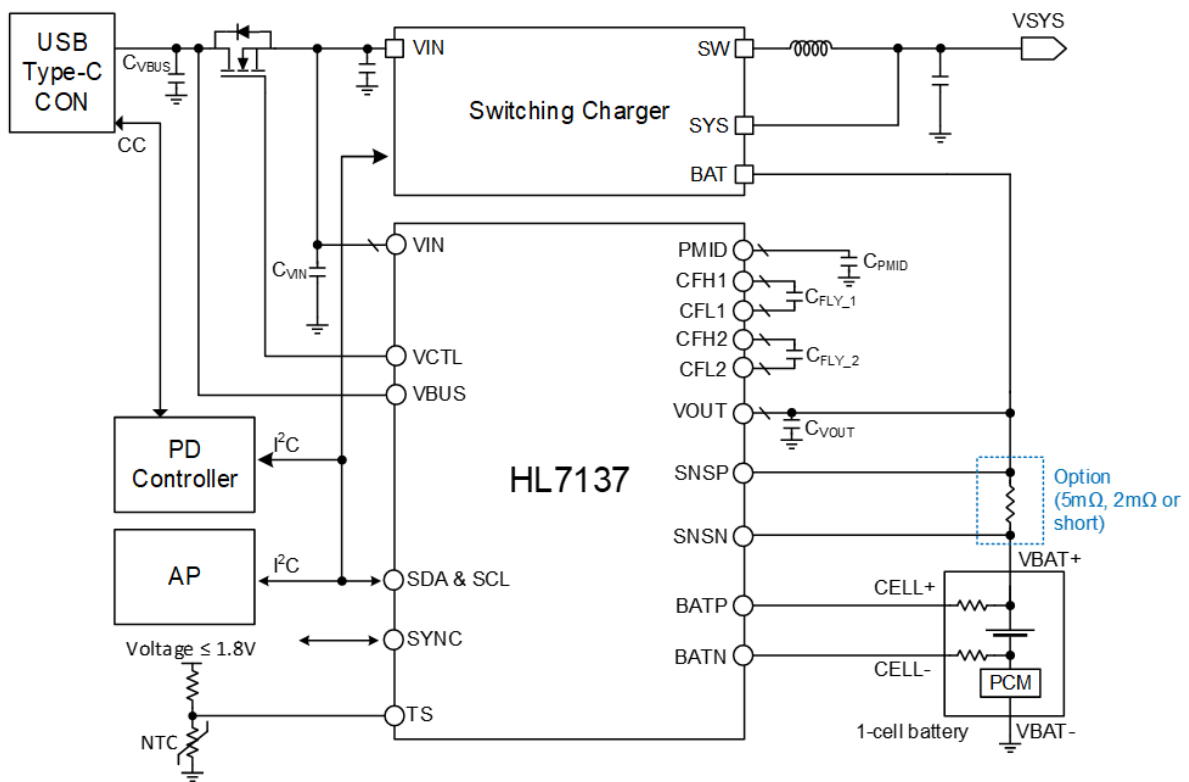


Figure 1. Simplified System Diagram

## Ordering Information

Part Number	Package	Remark
HL7137WL01	36-Bump WLCSP 2.67mm x 2.63mm	

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